

NOMENCLATURAL AND TAXONOMIC NOTES ON COSTA RICAN PALMS
(ARECACEAE), WITH FIVE NEW SPECIES

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ABSTRACT

Five new species of Arecaceae, all apparently endemic, are described from Costa Rica: *Bactris polystachya* H. Wendl. ex Grayum, *Calyptrogyne herrerae* Grayum, *Chamaedorea hodelii* Grayum, *Geonoma brenesii* Grayum, and *Geonoma talamancana* Grayum. The obscure and much-abused name *Chamaedorea graminifolia* H. Wendl. is applied to a rare Costa Rican species; *Chamaedorea schippii* Burret, based on a Belizean collection, is removed from the synonymy of *C. graminifolia*, and the description of the latter species is amended accordingly. *Chamaedorea coralliformis* Hodel and *C. crucensis* Hodel are shown to be synonymous; *C. crucensis* has priority, and thus becomes the accepted name. The prevailing application of the name *Chamaedorea zamorae* Hodel, to an orange-fruited species of the Pacific lowlands of Costa Rica, is upheld. A key to the Costa Rican and Panamanian species of *Chamaedorea* subgen. *Stephanostachys* with spicate inflorescences is provided. The name *Desmoncus costaricensis* (Kuntze) Burret is interpreted as applying to the rarer of two *Desmoncus* spp. occurring on the Atlantic slope of Costa Rica, and its basionym (*Atitara costaricensis* Kuntze) is epitypified. The name *Desmoncus schippii* Burret is accepted for the second, more common species, and full synonymy is provided. The authorship of the name *Elaeis oleifera* (Kunth) Cortés is retained as such.

KEY WORDS: Arecaceae, *Calyptrogyne*, *Chamaedorea*, *Desmoncus*, *Elaeis*, *Geonoma*, Palmae, Costa Rica, systematics

Work toward a treatment of the palm family (Arecaceae) for Costa Rica has uncovered five species new to science, in four genera. These novelties are here published, for use in several upcoming regional floras. At the same time, several other miscellaneous nomenclatural and taxonomic problems are resolved.

BACTRIS

BACTRIS POLYSTACHYA H. Wendl. ex Grayum, *spec. nov.* TYPE: COSTA RICA. Alajuela: Cantón de Upala, along Río Chimurria in vicinity of Colonia Puntarenas, ca. 11 km (by road) SE of Upala, 10° 49' N, 84° 53' W, ca. 80–100 m, 17 Nov 1988, M.H. Grayum, G. Herrera, & R. Evans 9044 (HOLOTYPE: MO!; Isotype: INB!).

Species cum *Bactride longiseta* H. Wendl. ex Burret optime congruens, sed differt foliis numerosioribus longioribus angustioribusque ordinate dispositis in plano unico setis marginalibus brevioribus.

Stems 3–6 m tall and ca. 2.0–2.5 cm diam., the internodes spiny. Petioles beyond sheath 14–49 cm, unarmed or sparsely spiny. Leaf-blades pinnately compound, to ca. 1.35 m long, the rachis densely brownish scurfy, unarmed or remotely spiny, leaflets 15–31 per side, regularly spaced, arranged in a single plane, 30–83 × 3.5–7.0 cm (medial ones), linear to narrowly elliptical, usually with larger marginal spines ca. 0.4–2.5 cm. Peduncle ca. 10 cm, strongly recurved, with bract 23–37 cm long, densely spiny. Infl. rachis 1.5–5.0 cm; rachillae 20–30, 4.5–11.0 cm long. Male fls. ca. 4–5 mm long. Female fls. ca. 2.5–3.0 mm long; calyx nearly as long as corolla; staminodes not evident. Ripe frts. ca. 1.5–1.8 × 1.5–1.8 cm, oblate to obovoid, bluntly rostrate, orange.

Endemic to Costa Rica, Atlantic slope of the Cordilleras de Guanacaste and Central and adjacent coastal plains; 0–150 m.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Province Unknown: flum. Sarapiquí, *Wendland s.n.*, 1857 (K). Heredia: Boca del Toro Amarillo, Sarapiquí, *Poveda 1017* (CR). Limón: Refugio Nacional de Fauna Silvestre Barra del Colorado, forests and pastures between Río Chirripocito and R. Sardina ("Sardinal" on Chirripó Atlántico quadrangle), 10° 38' N, 83° 45' W, ca. 10–15 m, *Grayum et al.* 8999 (MO).

Bactris polystachya comprises relatively large plants, resembling the coastal *B. major* Jacq. in stature and general aspect (namely, in having pinnately compound leaf-blades with the leaflets regularly spaced and arranged in a single plane). However, it differs sharply from *B. major* in its wider leaflets, shorter peduncles, more congested inflorescences with more numerous, shorter rachillae, absence of a staminodial ring in the corollas of the female flowers, smaller, orange (rather than purplish) ripe fruits, and forest habitat.

The new species is probably most closely related to a small group of Central American species with similar inflorescence structure and fruits, including *Bactris caudata* H. Wendl. ex Burret, *B. grayumii* de Nevers & Andrew Hend., and *B. longiseta* H. Wendl. ex Burret. These species differ from *B. polystachya* in having either simple leaves (*B. grayumii*) or else pinnately compound leaves with the leaflets clustered and arranged in more than one plane. Most similar to *B. polystachya* is *B. longiseta*, which shares prominent spines (to > 1 cm long) along the margins of the

leaflets. Indeed, these two taxa were not distinguished by de Nevers *et al.* (1996), who lumped both under *B. longiseta*. *Bactris polystachya* differs additionally from *B. longiseta* in its more numerous, longer and narrower leaflets with shorter marginal spines. Scattered reports of purplish fruits in *B. longiseta* suggest a more significant possible difference, but need verification.

Bactris polystachya was first collected by German horticulturist Hermann Wendland in 1857, along the Río Sarapiquí (*Wendland s.n.* [K]). The name "*Bactris polystachya*" is written on the label in Wendland's hand, suggesting that he recognized this as a new species distinct from *B. caudata* and *B. longiseta*, both of which he collected on the same trip and named distinctly. The last-mentioned two names were eventually validated by Burret (1933–1934); but, although the name *Bactris polystachya* has appeared several times in the literature as a *nomen nudum* (Hemsley 1882–1886; Dahlgren 1936; Standley 1937; Henderson *et al.* 1995; de Nevers *et al.* 1996), it has never been published validly.

The Wendland specimen is the only flowering collection of *Bactris polystachya* that I have seen; consequently, all of the inflorescence and floral data in the above description pertain to this specimen. Because Wendland's label does not indicate the month of the collection, no information on flowering phenology is available for this species.

According to the label of *Poveda 1017*, the *palmito* of *Bactris polystachya* is "dulce" and "muy agradable."

CALYPTROGYNE

CALYPTROGYNE HERRERAE Grayum, *spec. nov.* TYPE: COSTA RICA. Limón: Cantón de Limón, N flank of Fila Matama in headwaters of Río Boyei, Cordillera de Talamanca, 9° 45' N, 83° 19' W, 1200–1300 m, 17 Aug 1995, M.H. Grayum 11043 (HOLOTYPE: INB!; Isotypes: CR!, MO!).

A *Calyptrogyne trichostachyde* Burret petiolis stipite inflorescentiaeque brevioribus et sepalis florum masculinorum glabris margine ciliatisve, a *C. condensata* (L.H. Bailey) Wess. Boer rhachidi inflorescentiae longiore relative gracilioreque et floribus dissitoribus recedit.

Plants subcaulescent. Petioles beyond sheath ca. 11.5–31.0 cm. Leaf-blades pinnately compound, the rachis 62–90 cm, leaflets 10–14 per side, 16–48 cm long (medial ones). Peduncle (to scar) 123–162 cm. Infl. rachis ca. 22–24 cm, densely reddish brown stellate-tomentose (more sparsely so past anthesis); stipe ca. 0.9–2.0 cm long. Male fls. ca. 5.0 mm long, the sepals ± glabrous, or marginally ciliate; anthers ca. 2.0 mm. Female fls. 2.5–3.0 mm long. Ripe frts. described as "lila, dulces" (*Herrera 8836*), otherwise unknown.

Endemic to Costa Rica, Atlantic slope of Cordillera de Talamanca; 900–1400 m; August.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Limón: filas al este de Almirante, divisoria de aguas entre la cuenca superior de Río Xichiari [sic] y Río Boyei, 9° 44' 20" N, 83° 18' 30" W, 1400 m, *Herrera & Rojas A. 8492* (CR, 3 sheets); [Cantón de] Siquirres, Las Brisas de Pacuarito, siguiendo la fila superior margen izquierda de Quebrada Jesús, camino a Cerro Tigre, 9° 57' 00" N, 83° 25' 50" W, 900 m, *Herrera 8836* (CR).

Calypstrogyne herrerae is known from just three collections, all from mid-elevations on the Atlantic slope of the Cordillera de Talamanca north of Fila Matama. It belongs to a small group of species characterized by having the stipe and rachis of the inflorescence densely reddish-brown-tomentose, rather than glabrous or virtually so. The most well known species in this group is *C. trichostachys* Burret, of northern Costa Rica, which differs from the new species in having longer petioles (25–65 cm), longer inflorescence stipes (3.8–14.0 cm), and male flowers with the sepals densely tomentose distally. Somewhat more similar is *C. condensata* (L.H. Bailey) Wess. Boer, of extreme southeastern Costa Rica and adjacent Panamá at ca. 0–750 m; this differs from *C. herrerae* in having much shorter [9.3–11.8(–13.5?) cm] and relatively stouter inflorescence rachises, with more congested flowers.

It is an honor to dedicate this species to my valued friend and field companion of the last fifteen years, Gerardo Herrera Chacón, of Macacona de Esparza, Costa Rica. Gerardo, responsible for two of the three collections cited above, is widely respected as the most accomplished generalist plant collector currently working in the Mesoamerican region. This will also serve to commemorate his long-sought conquest of Cerro Tigre, which lived up to its promise in yielding this and many other significant records.

CHAMAEDOREA

A good, recent collection has spurred a reinterpretation of the long-misunderstood *Chamaedorea graminifolia* H. Wendl. As a result, a revised and augmented description of this species is here presented:

CHAMAEDOREA GRAMINIFOLIA H. Wendl., *Index Palm.* 62. 1854. TYPE: cult. Hannover (orig. "Guatemala?"), *Wendland s.n.* (HOLOTYPE: GOET!).

Stems solitary, to at least 2.5 m tall and 2.5 cm diam. Lvs. in crown ca. 3–5. Petioles beyond sheath ca. 21–30 cm, with basal, adaxial callus, the sheath tubular for most of its length and forming a brief crownshaft. Leaf-blades pinnately compound, the rachis ca. 66–88 cm; leaflets ca. 32–36 per side, ca. 25–31 × (0.3–)1.1–1.3 cm (medial ones), straight. Infls. infrafoliar; peduncle ca. 34–50 cm, suberect. Male infls. racemously branched; rachis ca. 2–7 cm; rachillae 5–15+, ca. 21–35 cm × 5–6 mm (fresh), pendulous; fls. (fresh) ca. 2–3 mm long, green, the petals distinct,

nerveless. Female infls. (in fruit) racemosely branched; rachis ca. 4.8 cm; rachillae 7, ca. 20–25 cm. Ripe frts. ca. 0.7 × 0.35 cm, smooth, ellipsoid.

Costa Rica and (perhaps) SE Nicaragua, Atlantic slope, Llanuras de San Carlos to Cordillera de Talamanca (near Panamanian border), 0–650+ m.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. [Alajuela:] plains of San Carlos, 100 m, *Cook & Doyle* 78 (US [5 sheets]; photo!); San Carlos, *Th. F. Koschny s.n.* [10] Mar. 1901 (GOET [5 sheets]; photo!). Limón: Finca Montecristo, on the Río Reventazón below Cairo, ca. 25 m, *Standley & Valerio* 49006 (US; photo!).

CULTIVATED. cultivada en el vivero del Sr. G. Herrera, San Miguel de Naranjo [Prov. Alajuela], Costa Rica, semillas traídas del Cerro Nimaso, Talamanca, [Prov.] Limón, 9° 28' 6" N, 83° 02' 4" W, 1093 m¹, *Cascante ex Herrera* 1410 (CR).

The name *Chamaedorea graminifolia* is based on a specimen prepared from a staminate plant of questionable origin cultivated in Germany about 150 years ago. Furthermore, the herbarium containing the type was lost for many years, though it was rediscovered about 30 years ago and is extant at GOET (see Wagenitz 1972). Consequently, the correct application of the name has long been in doubt, and it has been applied rather wantonly to a variety of species (as discussed by Hodel 1992).

Hodel (1992) studied most of the specimens cited above, but based his description of *Chamaedorea graminifolia* largely upon material from northern Mesoamerica that had previously been attributed to *C. schippii* Burret (a name newly synonymized by Hodel under *C. graminifolia*). The name *Chamaedorea schippii* is unambiguously typified by a Belizean collection, corresponding to a distinctive species (well known to Hodel in the field) characterized by its unusual, open-cespitose growth habit, with long-spreading rhizomes, pinnately compound leaf-blades with rather numerous, narrow, plicate leaflets, and limestone habitat. The morphology of the male flowers of Belizean material (with nerved petals connate basally and apically) would suggest membership in subgen. *Chamaedorea*, nevertheless, Hodel (1992) included *C. graminifolia* in subgen. *Chamaedoropsis* Oerst., presumably on the basis of the corollas of the male flowers on the holotype collection (reinterpreted by Hodel as apically free, rather than connate, as stated in the protologue).

All of the Costa Rican collections cited above are either sterile or (*Cook & Doyle* 78) fruiting, with the exception of *Cascante ex Herrera* 1410, a staminate collection at full anthesis. My exhaustive analysis of these specimens, in conjunction with the type of *Chamaedorea graminifolia* and material from northern Mesoamerica previously attributed to *C. schippii* (including the type), has led to the following principal conclusions: first, the Costa Rican collections, though from disparate sites and representing both genders, exhibit a fundamental uniformity in all their features, and

¹This is the summit elevation of Cerro Nimaso, as per the specimen label. However, according to Gerardo Herrera (the original collector), the population was located further downslope, perhaps 2/3 of the way toward the summit, hence, the "650+" figure in the foregoing distribution summary.

may be confidently regarded as conspecific; second, the Costa Rican collections do not match the holotype or the original description of *C. schippii*, or any other material from Belize and adjacent countries so identified; third, the Costa Rican collections exhibit a near-perfect congruence, in all critical details, with the type and protologue of *C. graminifolia*, for which they are a better match than *C. schippii* (or any other named entity); fourth, and following automatically from the preceding conclusions, the name *C. schippii* applies to a distinctive species with no other valid name, and should thus be liberated from the synonymy of *C. graminifolia*.

The Costa Rican species here designated as *Chamaedorea graminifolia* differs from the more northern *C. schippii* (and agrees correspondingly with the holotype of *C. graminifolia*, where comparison is possible) in numerous features, including its solitary habit (*Cascante ex Herrera 1410*), narrower (< 1.5 cm) leaflets, longer peduncles, fewer, longer, and thicker male rachillae, staminate floral morphology (with distinct, nerveless petals), fewer and longer female rachillae, and narrower (absolutely and proportionately) fruits. The morphology of the male flowers (as evaluated from both the holotype and *Cascante ex Herrera 1410*) precludes membership in subgen. *Chamaedorea*; instead, *C. graminifolia* must belong either to subgen. *Chamaedoropsis* or (because of its relatively thick, lax, densely flowered male rachillae) subgen. *Stephanostachys* Klotzsch.

Chamaedorea graminifolia is apparently a very rare and local species, and one that has seldom been cultivated. *Cook & Doyle 78*, collected in 1903, remains the only known fertile specimen prepared from a wild-growing plant (as well as the only pistillate collection). The Koschny collection was cited by Burret (1933:740), who had also seen Wendland's original material. Burret's familiarity with this authentic material of *C. graminifolia* lends credence to his citation of a Nicaraguan collection, *Schramm s.n.* (probably at B, and now apparently lost), under that name. The locality of the Schramm collection (Bluefields, in southeastern Nicaragua) is harmonious with the known occurrence of *C. graminifolia* in northeastern Costa Rica. The provenance of *Cascante ex Herrera 1410* suggests that *C. graminifolia* should also be sought in Prov. Bocas del Toro, Panamá. Wendland's (1854) indication of "Guatemala?" as the provenance of his living (type) material should be no cause for consternation, because that name is known to have been used by several early horticultural collectors (e.g., von Friedrichthal) to include Costa Rica.

CHAMAEDOREA HODELII Grayum, *spec. nov.* TYPE: COSTA RICA. Cartago: Cantón de Paraíso, Valle del Reventazón, unión del Río Grande de Orosi y Dos Amigos, 9° 42' 18" N, 83° 47' 02" W, 1480 m, 19 Jul 1994, E. Lépiz, J. González, & J.F. Morales 485 (HOLOTYPE: INB-582382!, INB-582383!).

Differt a *Chamaedorea allenii* L.H. Bailey sepalis florum masculinorum distinctis et fructibus maturis laevibus, a *C. crucensi* Hodel atque *C. zamorae* Hodel petalis florum masculinorum in dimidio inferiore connatis et fructibus maturis atropurpureis.

Stems solitary, 0.7–2.0 m tall and ca. 0.9–2.0 cm wide. Lvs. in crown 3–6. Petioles beyond sheath 6.5–32.0 cm, the sheath split distally, mostly tubular. Leaf-blades pinnately compound, the rachis 14.5–54.0 cm; leaflets ?–10 per side,

(10-)14-34 × 1.7-7.6 cm (medial ones), sigmoid. Infls. interfoliar (becoming infrafoliar); peduncle 17.5-46.0 cm, suberect to nodding. Male infls. spicate; rachis ca. 20-22 cm, pendulous; fls. ca. 6.5-7.0 mm long, light green to yellow, the petals connate for 1/2-3/4+ their length and erect distally, lightly nerved. Female infls. spicate; rachis ca. (3.3-)7.0-11.5(-17.5) cm, suberect to nodding; fls. ca. 2-3 mm long, greenish white. Ripe frts. 1.0-1.1 × 0.8-1.0 cm, smooth, subglobose or obovoid-prismatic, dark purple or black.

Endemic to Costa Rica, Atlantic slope and near Continental Divide, Cordilleras de Tilarán (rare), Central, and Talamanca; (700-)1100-2000+ m; May, July-November.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Alajuela: Monteverde, Reserva Biológica Monteverde, 5 km NW of Poco Sol, 10° 23' N, 84° 42' W, 1300 m, *Ivey 97* (CR [3 sheets]). Cartago: about 15 km S of Tapantí, on the E slope above the Río Grande de Orosi, 9° 42' N, 83° 47' W, 1500 m, *Burger & Liesner 6829* (CR); Tapantí, 1300-1700 m, *I.A. Chacón et al. 1427* (CR,MO); cañón del Río Grande de Orosi y aluvión, *I.A. Chacón et al. 1492* (CR [2 sheets],MO); Tapantí Reserve, ca. 1 km S of jct. of Quebrada Salto and Río Grande de Orosi, along trail heading eastward into mountains, 9° 43' N, 83° 47' W, 1500-1800 m, *Croat & Grayum 68283* (MO); Reserva de Tapantí, 1300-1800 m, *Gómez 18790* (MO), *18868* (MO), *18881* (MO); Tapantí, 1400-1700 m, *Gómez 19206* (MO); [Cantón de] Turrialba, Cerro Tigre, cabeceras de quebradas innominadas, cuenca superior de Quebrada Ayil, 9° 55' 10" N, 83° 23' 25" W, 1200 m, *Herrera & Mora 8910* (CR); [Cantón de] Turrialba, Cerro Tigre, siguiendo la quebrada innominada, bajando hasta Lago Ayil, 9° 54' 40" N, 83° 22' 55" W, 700 m, *Herrera & Valverde 8924* (CR); Cantón de Turrialba, 6 km beyond Moravia at crossing of Río Platanillo, 9° 49' 10" N, 83° 33' 00" W, 1000-1500 m, *Hodel & Grayum 982* (CR); lower slopes of Alto Patillos, 6.5 km SE of Tapantí, 1470 m, *Lent 1080* (CR [3 sheets]); Cantón de Paraíso, unión del Río Grande de Orosi y Dos Amigos, 9° 42' 18" N, 83° 47' 02" W, 1480 m, *Lépiz et al. 483* (CR,INB); ca. 6 km S of Cartago by air, Quebrada Cangreja, 3 km S of Pan American Highway, remnant forest, 9° 46' N, 83° 57' W, 1620-1650 m, *Liesner & Judziewicz 14497* (CR,MO); P. N. Tapantí, sector Quebrada Segunda, 9° 45' 50" N, 83° 47' 15" W, 1200-1400 m, *Mora 317* (INB); Reserva Forestal Tapantí, Sendero Oropéndola, 9° 54' 06" N, 83° 47' 27" W, 1300 m, *J.F. Morales et al. 421* (CR [2 sheets]); vicinity of Orosi, *Standley 39923* (US); El Muñeco, on the Río Navarro, 1400-1500 m, *Standley & Torres R. 51700* (US); cerca del Mirador, Tapantí, ± 1200 m, *Umaña et al. 370* (CR); Orosi, Refugio de Fauna Silvestre, Tapantí, Sendero Palmito, *Marlon Valerio et al. 27* (CR). Heredia: Parque Nacional Braulio Carrillo, 10° 15' N, 84° 06' W, 1450 m, *Chazdon 187* (CR); Parque Nacional Braulio Carrillo, 11 km S, 11.5 km E of San Miguel, 10° 16' N, 84° 05' W, 1130 m, *Chazdon 204* (CR [2 sheets]); Cerro de Las Caricias, north of San Isidro, 2000-2400 m, *Standley & Valerio 52452* (US). Limón: Cantón de Limón, N flank of Fila de Matama in headwaters of Río Boyei, Cordillera de Talamanca, 9° 45' N, 83° 19' W,

1200–1300 m, *Grayum 11012* (INB); Cantón de Guápiles, Los Angeles, San Miguel, siguiendo el camino entre Río Blanco y Río Blanquito, 10° 06' 20" N, 83° 50' 40" W, 1200 m, *Herrera 3759* (CR); Cordillera de Talamanca, sendero de Quebrada Kuisa a Río Lori, entre Ujarrás y San José Cabécar, 9° 21' 30" N, 83° 14' 00" W, 1780 m, *Herrera 5925* (INB), [Cantón de] Limón, filias al este de Almirante, cuenca superior Río Boyei, rumbo a Fila Matama, 9° 44' 20" N, 83° 17' 40" W, 1300 m, *Herrera 8510* (CR); Cantón de Limón, El Progreso, Fila Matama, 9° 47' 18" N, 83° 08' 45" W, 1350 m, *Herrera & Chacón 2666* (CR). Puntarenas: [Cantón de] Puntarenas, La Pitahaya, Rincón, siguiendo la fila entre Río Aranjuez y Quebrada Vueltas, 10° 15' 30" N, 84° 41' 00" W, 1400 m, *Herrera et al. 9086* (CR). San José: south facing slopes of Cerro Zurquí at termination of Calle Zurquí ["San José/Heredia Province Border"], 1800–2000 m, *Almeda & Nakai 3705* (CR); Parque Nacional Braulio Carrillo, La Montura, 900–1100 m, *Chazdon 237* (BH [3 sheets]), *Hodel et al. 977* (BH,CR); Bajo de Hondura, Parque Nacional Braulio Carrillo, ca. 10° 4' N, 83° 58' W, 1100–1200 m, *Davidse et al. 23159* (MO); Alto La Palma, 1500 m, *Gómez 4039* (CR [4 sheets]); Braulio Carrillo, area Zurquí ["Prov. Heredia"], 1800 m, *Gómez 20093* (MO), *20095* (MO); eastern spur ridge of Cerro Hondura, between Río Patria and Río Zurquí (north of tunnel), Cordillera Central, 10° 04' N, 84° 01' W, 1500–1600 m, *Grayum & Sleeper 6123* (MO); Parque Nac. Braulio Carrillo, trail from hwy. at La Ventana to Bajo La Hondura, 10° 04' N, 83° 59' W, 1100–1300 m, *Solomon 19178* (INB).

Chamaedorea hodelii is a member of subgen. *Stephanostachys*, an essentially Mesoamerican group of about ten species characterized by more or less lax, densely flowered staminate inflorescences. This is a moderately well-known species of montane Costa Rica, adequately represented in herbaria for the better part of the century. However, these collections have been filed under a confusing succession of names, reflecting the gradual evolution in our understanding of the taxonomically complex group to which this species belongs. Now that the dust may have finally settled, it appears that this familiar species has somehow been left with no name at all!

Standley (1937) applied the name *Chamaedorea arenbergiana* H. Wendl. to material primarily or exclusively representing *C. hodelii*. Subsequently, the name *Chamaedorea allenii* L.H. Bailey was much employed (in herb.), in a broad sense, to most of the Costa Rican species of subgen. *Stephanostachys* with spicate inflorescences (especially, to *C. hodelii*, *C. crucensis* Hodel, and *C. zamorae* Hodel). However, as shown by Hodel (1990, 1992), *Chamaedorea arenbergiana* is a more northern species (southern México to Honduras), larger than *C. hodelii* in all its vegetative parts, with shorter peduncles and racemously branched male inflorescences (with 8–10 rachillae), while *C. allenii* is a more southern species (west-central Panamá to northwestern Colombia), characterized by bright yellow male fls. with fully conn. te sepals and finely echinulate ripe frts. Most recently, the material here assigned to *Chamaedorea hodelii* has been subsumed (in herb. and by Hodel 1992) with *C. crucensis*, of similar elevations on the Pacific slope of Costa Rica; however, the latter species (as here interpreted) is well distinguished by having larger leaves with more numerous (6–13) leaflets, staminate flowers with more or less distinct petals, and bright orange to red, verrucose-echinulate ripe fruits.

The recognition here of *Chamaedorea hodelii* as a distinct, previously unnamed species is the result of an investigation into the identity of *C. crucensis*, which itself requires some explanation. The type of the latter name, and all of the original material, was collected from remnant forests adjacent to the Las Cruces Botanical Garden (now Jardín Botánico Robert y Catherine Wilson) in extreme southwestern Costa Rica (Hodel 1990). Later, Hodel (1992) enlarged the concept of *C. crucensis* by including numerous collections from montane regions of central Costa Rica. Some of this last-mentioned material, here distinguished as *C. hodelii*, is illustrated under the name *Chamaedorea crucensis* in Hodel (1992: Plate 115B–E).

I soon began to suspect, on morphological grounds, that two different species were mixed under the name *Chamaedorea crucensis*. The material from central Costa Rica appeared to differ consistently from all of the collections I had seen from the Las Cruces region, particularly in leaf dimensions and leaflet number. Indeed, the Las Cruces population, upon which the name *C. crucensis* was typified, emerged as poorly understood in general, with respect to the other, comparatively well-circumscribed Costa Rican entities in this complex. None of the wild collections I had seen from Las Cruces bore either staminate inflorescences or ripe fruits, both crucial for species identification in this complex. Based on phytogeographic precedent, the Las Cruces forests might reasonably be expected to harbor any of several species in this group, including the more upland *C. coralliformis* Hodel (1996), the more lowland *C. zamorae*, the more southern *C. allenii*, the mainly Atlantic slope species here called *C. hodelii*, or even a very local endemic; moreover, many non-indigenous species are cultivated at the site, and the provenance of herbarium collections (*i.e.*, forest or garden) is not always indicated clearly on labels (and may be ambiguous even in the field). The challenge thus shifted to establishing the correct application of the name *C. crucensis* according to its type. This difficulty was exacerbated by the fact that I had not (and still have not) been able to locate either the holotype (Hodel & Hodel 706A) or the single isotype of *C. crucensis*, ostensibly at BH and CR, respectively, but not currently present at either institution.

I approached this problem by generating rigorous, specimen-based descriptions of all the taxonomic entities involved, as I understood them, with special attention to the seldom collected, yet diagnostically critical, staminate inflorescences. These descriptions were then compared with a parallel description of wild-collected Las Cruces material, augmented considerably by a recent loan from BH which contained both staminate inflorescences and virtually ripe fruits. My conclusion is that the indigenous Las Cruces population corresponds unequivocally and exclusively to the species known previously as *Chamaedorea coralliformis*, which name thus becomes a synonym of the earlier *C. crucensis*.

The distinct petals and sepals of male flowers of the two wild-collected staminate Las Cruces collections, *Moore & Parthasarathy 9444* (BH) and *Read 651* (BH), immediately eliminate *C. hodelii* and *C. allenii*, the male flowers of which have connate petals and sepals, respectively. The male flowers of both Las Cruces collections have narrowly ligulate sepals nearly as long as the petals, just as in *C. coralliformis*, but not *C. zamorae* (with quadrate or obdeltate sepals about half as long as the petals). The staminate sepals are also described as "narrow" in the protologue of *C. crucensis* (Hodel 1990). Fruits of Las Cruces collections are described as "orange-red" [on *Moore & Parthasarathy 9431* (BH), where they are not present] and

"maturing red" [on *Moore 9991* (BH), where they are present], in agreement with *C. coralliformis* and *C. zamorae*, but not *C. hodelii* or *C. allenii* (which have black fruits). Some fruits on *Moore & Parthasarathy 9444* (BH) clearly exhibit evidence of the echinulae characteristic of *C. coralliformis*, but not of *C. zamorae*. Finally, leaflet number in the Las Cruces population ranges from 7–13 per side, as typical only of *C. coralliformis* (none of the other species mentioned in this paragraph is known to have more than 10 leaflets per side).

Because the type collection of *Chamaedorea coralliformis* (*Hodel & Binder 1345* [BH!]) is pistillate, information on staminate inflorescences was obtained from specimens collected in the region of the type locality, in association with pistillate material, and agreeing with the latter in vegetative morphology, e.g., *Gamboa et al. 26* (INB).

Incidentally, this research has also confirmed the prevailing application of the name *Chamaedorea zamorae*. That name was based, quite unfortunately, on a collection prepared from a plant of somewhat dubious provenance cultivated in Hawaii (*Hodel 1990*). Although *Hodel (1990, 1992)* first applied the name to a varied assemblage of material (probably including *C. hodelii*), it has since come to be restricted (in herb. CR,MO,INB) to a distinctive entity, characterized by simple or pinnately compound leaf-blades and bright orange ripe fruits, ranging south from the Reserva Biológica Carara through the Pacific lowlands of Costa Rica. The flowers of the (fortunately!) staminate holotype of *C. zamorae* (*Hodel & Bornhorst 830* [BH!]) correspond in all details (as described above) with male flowers of the Pacific lowland entity. The provenance of the type material, indicated as "near Laguna de Arenal, Guanacaste, Costa Rica," must thus be regarded with suspicion, since *C. zamorae* has never been found anywhere near that locale.

Another bothersome, cultivated collection of *Chamaedorea zamorae* is *N.W. Uhl s.n. 2 Apr. 1984* (BH), prepared from a staminate plant grown at BH (as BH76:620) from seeds obtained by H.E. Moore, Jr. from Las Cruces. This specimen can be identified unambiguously as *C. zamorae* on the basis of its simple leaf-blades (unknown in *C. coralliformis*/*C. crucensis*), as well as its floral morphology. Although these seeds probably came from non-indigenous material cultivated at Las Cruces, it is possible that *C. zamorae* may also (i.e., in addition to *C. crucensis*) occur naturally in the vicinity.

Chamaedorea hodelii, here denoting the material from central montane Costa Rica included by *Hodel (1992)* in *C. crucensis*, differs substantially from the latter species in having shorter petioles with mostly tubular sheaths, shorter leaf-blades with fewer and more strongly sigmoid leaflets, longer male flowers with the petals connate for half or more their length, and smooth, purplish to black fruits. The distinctions among the various species discussed in the foregoing paragraphs are summarized in the following key, which treats all Costa Rican and Panamanian members of subgen. *Stephanostachys* with spicate (or, rarely, furcate) inflorescences. Note that the key includes *Chamaedorea robertii* *Hodel & N.W. Uhl*, assigned by *Hodel (1992)* to subgen. *Chamaedoropsis* but, in my view, better accommodated here.

- 1 Leaf-blades all simple, bifid.
- 2 Plants often acaulescent at maturity (always so in Costa Rica); leaf-blades with ca. 9–16 primary lateral veins per side; peduncular bracts of female inflorescences purplish; ripe fruits black, smooth; Atlantic slope. *C. robertii*
- 2' Plants usually caulescent at maturity (*C. allenii* may be acaulescent); leaf-blades with ca. (11–)15–50 primary lateral veins per side; peduncular bracts of female inflorescences green; ripe fruits orange or (if black) echinulate; both slopes.
- 3 Male inflorescences multiple (ca. 4–10) per node, the rachises ca. 5.5–9.5 cm; ripe fruits orange to red-orange, smooth; Atlantic slope. . *C. deckeriana*
- 3' Male inflorescence solitary at nodes, the rachises ca. 10–27 cm; ripe fruits orange or black, smooth or echinulate (if orange and smooth, plants of Pacific slope).
- 4 Sepals of male flowers connate in a ring; ripe fruits black, echinulate; Panamá and NW Colombia. *C. allenii*
- 4' Sepals of male flowers distinct; ripe fruits orange to orange-red, smooth; Costa Rica. *C. zamorae*
- 1' Leaf-blades (at least some) pinnately compound.
- 5 Sepals of male flowers connate in a ring; ripe fruits blackish, echinulate; Panamá and NW Colombia. *C. allenii*
- 5' Sepals of male flowers distinct; ripe fruits orange to red, or (if blackish) smooth; Costa Rica.
- 6 Petals of male flowers connate for more than half their length; ripe fruits black; Atlantic slope and near Continental Divide. *C. hodelii*
- 6' Petals of male flowers distinct; ripe fruits orange to red; Pacific slope.
- 7 Leaflets ca. 6–13 per side; sepals of male flowers narrowly ligulate to oblanceolate, > 2× as long as wide, ca. 3/4 to as long as petals; ripe fruits coarsely echinulate; (1150–)1500–2300 m.
..... *C. crucensis* (including *C. coralliformis*).
- 7' Leaflets ca. 3–9 per side; sepals of male flowers quadrate to obdeltate, ca. 1–2× as long as wide, ca. 1/2 as long as petals; ripe fruits smooth; 50–500(–800) m. *C. zamorae*

It gives me great pleasure to dedicate this new species to my friend and colleague Donald R. Hodel, of the University of California at Los Angeles, who, in ten short years, has created order out of chaos in *Chamaedorea*.

DESMONCUS

The genus *Desmoncus* is notoriously difficult taxonomically. In Costa Rica, it is represented by at least three species: the highly distinctive, non-scandent *Desmoncus stans* Grayum & de Nevers (1988), of the southern Pacific lowlands, and two scandent species of the Atlantic lowlands. Scattered collections of scandent

Desmoncus from the Pacific slope may represent as many as two additional species, but this material is inadequate for determination and cannot be dealt with here.

The two well-characterized, scandent *Desmoncus* species of the Costa Rican Atlantic lowlands are distinguished as follows:

- 1 Weakly scandent plants in understory, to ca. 2.5–6.0 m tall; petiole beyond sheath ca. 10–16 cm; foliar leaflets (*i.e.*, excluding acanthophylls) ca. 8–11 per side, broadly elliptical, the larger ones > 5 cm wide, spineless adaxially; inflorescence rachis ca. 4.5–5.5 cm; rachillae ca. 15–17, ca. 3–7 cm; 0–200+ m, Atlantic slope Cordillera de Talamanca..... *Desmoncus* sp. I
- 1' Robust lianas often ascending to canopy, fertile individuals ca. 5–20+ m tall; petiole beyond sheath ca. 1.5–5.0 cm; foliar leaflets ca. 16–23 per side, narrowly elliptical to lanceolate, the larger ones < 5 cm wide, with beard of spines adaxially at base; inflorescence rachis ca. 12–24 cm; rachillae ca. 19–44, ca. 4.5–21.0 cm; 0–300 (–600) m, N Atlantic slope (Llanura de Guatuso to Llanura de Tortuguero).....
..... *Desmoncus* sp. II

The correct application of names to these two species has presented a significant challenge. Traditionally, the name *Desmoncus costaricensis* (Kuntze) Burret has been used for any *Desmoncus* collected in Costa Rica. However, for the purpose of producing their field guide in a timely fashion, Henderson *et al.* (1995) synonymized this and all other names for scandent Mesoamerican *Desmoncus* under *D. orthacanthos* Mart., typified by a collection from Atlantic Brazil. This would appear to be a clear case of overlumping, inasmuch as several distinctive scandent *Desmoncus* species occur in the Mesoamerican region. Moreover, the application of the name *D. orthacanthos* to any Mesoamerican entity seems unlikely on biogeographic grounds, and is not supported by morphological evidence (based on my studies of a photo of the type, and of herbarium collections from near the type locality).

With the name *Desmoncus orthacanthos* thus eliminated, the case of *D. costaricensis* must next be considered. Because the latter name pertains to a scandent plant collected in Costa Rica, it almost certainly applies to one of the two species keyed above (even if it is not the earliest name). But despite the distinctiveness of these two species, the identity of *D. costaricensis* is not obvious, even though its basionym (*Aitara costaricensis* Kuntze) is typified by an extant collection (Kuntze *s.n.*, Jun. 1874 [NY]). The holotype looks as though it had been snatched from a passing train: a mangled, moldy, sterile specimen, comprising only the extreme distal portions of two leaf-blades. The citation of the type locality ("südlich von San José im Gebirge") is vague, virtually to the point of inscrutability. No species of *Desmoncus* are known from the mountains immediately to the south of San José (Cerros de la Carpintera, Altos de Tablazo, Cerros de Escazú, *etc.*), and Kuntze's rather hurried traverse through the central part of the country would not have permitted a side-trip to the southern Pacific lowlands. In any case, the date of the collection would nearly guarantee an Atlantic slope site, according to the itinerary of Kuntze (1881:94–115), who entered Costa Rica at Puerto Limón and, by 30 June, had just reached Alajuela.

The published descriptions and holotype of *Desmoncus costaricensis* afford very few clues as to its identity. Two of the better ones must, unfortunately, be discounted.

First, as noted by Burret (1934, in translation²): "The pinnae [of *D. costaricensis*] are broadly lanceolate, in contrast to *D. Schippii* and *D. leiorhachis*." The leaflets of *Atitara costaricensis* are described in the protologue (Kuntze 1891) as "late lanceolata," with the width/length ratio given as "1:4-5." This accords well with *Desmoncus* sp. I, but not sp. II, which generally has much narrower leaflets (ca. 1:9-10+). However, the source of the information on *Desmoncus (Atitara) costaricensis* is suspect; the holotype presently bears not a single, intact leaflet that would permit the necessary measurements to be made. Moreover, reduced, distal leaflets of sp. II may sometimes be proportionately as broad as the larger leaflets of sp. I, and the holotype of *A. costaricensis* bears only such distal leaflets. Second, the leaflets on the holotype of *A. costaricensis* show no evidence of a basal, adaxial beard of spines, again suggesting sp. I rather than sp. II. But these spines are not evident on every leaf section of sp. II.

Two other morphological details point more convincingly in the direction of sp. I. First, the only leaflet fragment on the holotype of *Atitara costaricensis* that affords a clean width measurement yields a value of ca. 4.2 cm, along an obviously subterminal transect. This is the maximal leaf width I have recorded for the largest leaflets of sp. II; however, because this measurement was taken from one of the smaller (distal) leaflets, and not even at the widest (medial) part, sp. I is strongly implicated. Second, one leaf-rachis on the holotype of *A. costaricensis* bears a stout, black spine ca. 3.1 cm long. This is characteristic of sp. I, but exceeds by nearly 1 cm the maximal leaf-rachis spine length I have recorded for sp. II.

Based on the foregoing rationale, I propose to apply the name *Desmoncus costaricensis* to the species designated as "sp. I" in the above key. I believe the evidence for this to be the best obtainable at the present time. Furthermore, I have found no other name that seems to apply to this species. Because the holotype of *Atitara costaricensis* is scarcely (and arguably) identifiable, and no isotypes exist, I here designate a good, modern collection as epitype (see Art. 9.7 in Greuter *et al.*, 1994):

DESMONCUS COSTARICENSIS (Kuntze) Burret, Repert. Spec. Nov. Regni Veg. 36:202. 1934. BASIONYM: *Atitara costaricensis* Kuntze, *Revis. Gen. Pl.* 2:726. 1891. TYPE: COSTA RICA. [Province Unknown:] "südlich von San José im Gebirge," Jun 1874, *O. Kuntze s. n.* (HOLOTYPE: NY!). EPITYPE [here designated]: COSTA RICA. Limón: ridge separating Quebrada Cañabral from Río Barbilla, and slope leading down to the latter, Cordillera de Talamanca, 10° 02' N, 83° 26' W, ca. 200-400 m, 4 Sep 1988, *M.H. Grayum, G. Herrera, & R. Robles 8746* (MO!; Isoepitype: INB!).

Desmoncus costaricensis appears to be a local endemic, probably ranging onto the Atlantic slope of western Panamá. However, I have seen no collections from outside Costa Rica. Although the original type locality of *D. costaricensis* is obscure, limited speculation is possible. Kuntze entered Costa Rica at Puerto Limón and traveled directly to San José via Siquirres (Kuntze 1881), very near to the epitype locality cited above. Although Siquirres lies due east (rather than south) of San José, it seems likely

²Original German: "Die Fiedern sind breit lanzettlich, im Gegensatz zu *D. Schippii* und *D. leiorhachis*."

that Kuntze, in the midst of a journey around the world, might not have given much thought to this detail (especially considering the abject condition of his type collection). The reference to "Gebirge" (mountains) may also be significant. According to Kuntze (1881:103), "Von Baguar an beginnt das Gebirge." This would seem to restrict the type locality of *Atiara costaricensis* to the region between "Baguar" (probably a corruption of "Pacuare," a site just east of Siquirres) and the upward limit of *Desmoncus* habitat along the railway route to the Meseta Central.

Desmoncus sp. II, according to my taxonomic concept, ranges more widely than *D. costaricensis*: north on the Atlantic slope at least to Belize and Guatemala, and conceivably at scattered localities on the Pacific slope of Costa Rica. Because of the adaxial, basal beard of spines on its leaflets, sp. II belongs to the "alliance" of *Desmoncus chinantlensis* Liebm. ex Mart., as circumscribed by Bartlett (1935). Except for *D. costaricensis* and *D. stans* (discussed above), most if not all of the validly published *Desmoncus* names based on Mesoamerican types appear referable to this "alliance." Based on my study of type specimens and original descriptions, I have concluded that several of these names are applicable to sp. II. The oldest of these are *Desmoncus leiorrhachis* Burret and *D. schippii* Burret, based on collections from the same locality in southern Belize. Although I have seen neither type, both protologues are in substantial overall agreement with *Desmoncus* sp. II; moreover, all *Desmoncus* specimens I have seen from southern Belize represent sp. II, in my judgment. Leaf spininess, the principal character employed by Burret (1934) to separate *D. leiorrhachis* (spineless) from *D. schippii* (spiny), is probably inconsequential. I have made collections of both spiny and spineless plants of sp. II at the Estación Biológica La Selva, in Costa Rica (*Grayum* 7663, 7664 [INB,MO]), and have often observed this sort of variation in species of *Desmoncus* and of other spiny palm genera (e.g., *Bactris hondurensis* Standl.). Moreover, Burret (1934) himself cited a parallel example in a Mexican *Desmoncus*, and acknowledged considerable doubt as to the validity of his *D. leiorrhachis*, suggesting that it might better be treated as a variety of *D. schippii*.

The names *Desmoncus leiorrhachis* and *D. schippii* have equal priority, having been published in the same paper (Burret 1934). I choose the latter as the accepted name, primarily because Glassman (1972) indicated that its type specimen was extant at B, while questioning the existence of a type for *D. leiorrhachis*. Also, as mentioned above, Burret viewed *D. leiorrhachis* as a possible variety of *D. schippii*, not the other way around. My action would appear to establish a formal precedent in preferring one name over the other.

A potential thorn in this scenario is *Desmoncus leptochaete* Burret (1934), based on a Costa Rican type and equal in priority to *D. schippii*. The name *D. leptochaete* has been generally ignored, presumably because (as typical of Burret names) the type is lost and the protologue features no illustration. This name pertains to a scandent species of the Pacific lowlands, the type locality ("Río Abrojo") being near Ciudad Neily, Prov. Puntarenas, in the Golfo Dulce region. The original description of *D. leptochaete* categorically rules out *Desmoncus costaricensis* (sp. I), but concords generally with *D. schippii* (sp. II), although the leaflets are said to lack an adaxial beard of spines. However, I have seen no collections from the Pacific slope unequivocally referable to *Desmoncus* sp. II. Even more perplexingly, the lone fertile collection of a scandent *Desmoncus* that I have seen from the Golfo Dulce region (*Aguilar* 290 [INB,MO]) matches neither the description of *D. leptochaete*, nor either of the two Atlantic slope species. Thus, I am unable to resolve the identity of *D.*

leptochaete based on the evidence presently available. Should *D. leptochaete* prove conspecific with *D. schippii*, I would hope that some future worker will have the good sense to subordinate the former name.

The complete synonymy of *Desmoncus schippii*, according to my taxonomic concept, is as follows:

DESMONCUS SCHIPPPII Burret, Repert. Spec. Nov. Regni Veg. 36:202. 1934.

Desmoncus leiorhachis Burret, Repert. Spec. Nov. Regni Veg. 36:203. 1934.

Desmoncus ferox Bartlett, J. Wash. Acad. Sci. 25:87. 1935.

Desmoncus lundellii Bartlett, J. Wash. Acad. Sci. 25:84. 1935.

Desmoncus quasillarius Bartlett, J. Wash. Acad. Sci. 25:85. 1935.

Desmoncus uaxactunensis Bartlett, J. Wash. Acad. Sci. 25:86. 1935.

I have studied the types of all the Bartlett names cited above. Apart from *Desmoncus leptochaete*, discussed previously, the only regional names for members of the *D. chinantlensis* "alliance" not accounted for in the above synonymy are *D. anomalus* Bartlett, of Guatemala, *D. chinantlensis*, of southern México, and *D. isthmus* L.H. Bailey, of eastern Panamá. *Desmoncus chinantlensis*, in fact, substantially predates *D. schippii*, but I tentatively regard it as applying to a distinct species, based on the morphological evidence adduced by Bartlett (1935). *Desmoncus schippii* predates both *D. anomalus* and *D. isthmus*; the latter clearly pertains to a different species, and I have not seen the type of the former. The *Desmoncus chinantlensis* "alliance" ranges sparingly into South America, but none of the South American collections at MO matches *D. schippii*.

ELAEIS

ELAEIS OLEIFERA (Kunth) Cortés, *Flora de Colombia* 1:203. 1897. BASIONYM:
Alfonsia oleifera Kunth, in Humb., Bonpl. & Kunth, *Nov. Gen. Sp. Quarto ed.*
1:307, *Folio ed.* 1:246. 1816.

The combination *Elaeis oleifera* has long been attributed to Cortés (1897), as indicated above. However, Pires (1995) has recently argued that Cortés, who organized his work on the basis of common names, had no intention of making a new combination, and did not formally do so. Instead, Pires assigned authorship to the next worker to have taken up the name, Wessels Boer (in Lanjouw 1965:144), who fulfilled all the necessary requirements for validating the combination himself, even while crediting it to Cortés.

Although the primary entries in Cortés' work were indeed alphabetized according to common names, he did provide Latin names as well. "Corozo," the main entry in this case, was clearly intended as a common name (it is also a generic name), as pointed out by Pires; however, it is followed by "*Alfonsia oleifera*. HBK.," then by "Elaeis." Under the prevailing *Code* (Greuter *et al.* 1994), the only requirement for

valid publication of new combinations in 1897 would appear to be Art. 33.1, *i.e.*, that "the author definitely associates the final epithet with the name of the genus or species, or with its abbreviation." If that requirement is not met in the *Alfonsia oleifera* entry, it is surely satisfied in the very next one, in which the name "*Martinezia caryotifolia*" is followed immediately by "*Elaeis oleifera*?" This establishes that Cortés did intend to treat *Alfonsia oleifera*, formally or otherwise, under the genus name *Elaeis*. In any case, virtually no formalities are imposed upon new combinations published during Cortés' era, and the question of intent is quite irrelevant; after all, it might equally be argued that Wessels Boer did not intend to be making a new combination.

I therefore reject Pires's argument, and retain Cortés as the extraparenthetical author of the combination *Elaeis oleifera*.

GEONOMA

Study of Costa Rican collections previously determined as *Geonoma cuneata* H. Wendl. *ex* Spruce, *G. gracilis* H. Wendl. *ex* Spruce, and *G. jussieuana* Mart. has uncovered two new and apparently endemic species:

GEONOMA BRENESII Grayum, *spec. nov.* TYPE: COSTA RICA. Alajuela: Reserva Biológica de San Ramón, road from Las Lagunas to Colonia Palmareña, 10° 4' N, 84° 32' W, 850–1100 m, 30 May 1986, *G. de Nevers, B. Hammel, & C. Gómez 7789* (HOLOTYPE: MO-3387522!; Isotype: CR!).

A *Geonoma paradoxa* Burret bractea pedunculari altius affixa et rhachidi inflorescentiae trichomatibus albidis stellatisque vestita, a *G. hugonis* Grayum & de Nevers habitu acaulescenti laminis foliorum pinnatim divisis et bractea pedunculari in prophylo inclusa recedit.

Stems solitary, obsolete to ca. 0.5 m tall and to at least 3 cm diam. Petioles beyond sheath ca. 14–53 cm. Leaf-blades pinnately compound, the rachis 11.0–30.5 cm, leaflets 2–5(–7) per side, ca. 19–37 cm long (medial ones). Infls. interfoliar, spicate; peduncle 16.0–39.5(–56.0) cm, with narrow bract ca. (1.5–)4.2–15.5 cm long (or rarely obsolete), enclosed by prophyll and inserted ca. (0.8–)3.3–11.0(–16.5+) cm above it; rachis 6–19 × 0.2–0.5 cm, ± densely pubescent at anthesis with whitish, mostly branched or stellate hairs with ± flattened arms (later glabrescent). Male fls. ca. 3.0 mm long; stamens 6, the anthers sharply reflexed. Female fls. ca. 3.0–4.0 mm long; staminodial tube deeply crenately to subdigitately lobed. Ripe frts. ca. 0.7–0.8 × 0.5–0.6 cm, striate, broadly ellipsoid to obovoid, black.

Endemic to Costa Rica, Atlantic slope and near Continental Divide, Cordilleras de Tilarán and (very rare) Central; (850?–)1000–1600 m; January–July, October.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Alajuela: UCR Reserva, Fila Volcán Muerte [sic], above the headwaters of the Río San Lorenzo, 10° 12' N, 84° 32' W, 1000–1300 m, *Barringer & Gómez-Laurito 2541* (F); Reserva Biológica Monteverde, Bosque Eterno de los Niños, Quebrada Agua Gata, 10° 20' N, 84° 42' W, 1100 m, *Bello 1808* (CR); La Balsa, San Ramón, *Bermúdez MB245* (USJ); Piedades de San Ramón, 1120 m, *Brenes 4473* (F); Los Angeles de San Ramón, *Brenes 13588* (F [2 sheets]); Reserva de San Ramón, Río San Lorencito, 800–1000 m, *I.A. Chacón 1927* (CR); Reserva Biológica Monteverde, 3 km NW of Poco Sol, 10° 23' N, 84° 41' W, 1050 m, *Ivey 109* (CR); Bosque Eterno de los Niños, near Laguna Poco Sol, 10° 21' N, 84° 41' W, *Ivey 305* (CR). Guanacaste: ca. 3.5 miles from Santa Elena–Monteverde junction near the east edge of Monteverde reserve, ca. 1350 m, *Croat 47118* (MO); 1 km N of Las Nubes on road to Tilarán, 10° 23' N, 84° 51' W, 1200 m, *Ivey 68* (CR); vicinity of Santa Elena, 1500 m, *Meerow et al. 1088* (MO); San Luis de Zarcero, 1550 m, *A. Smith H774* (F [3 sheets]). Puntarenas: Monte Verde, *Bermúdez 144* (USJ [2 sheets]); about 2 km SE of Monteverde, 10° 18' N, 84° 48' W, 1500–1550 m, *Burger & Gentry, Jr. 8563* (CR,F); Monteverde, arriba de Quebrada Cuecha, 1540–1620 m, *Dryer 105* (CR), *872* (CR); Cantón de Puntarenas, Finca Buen Amigo, San Luis, Monteverde, 10° 16' 20" N, 84° 49' 30" W, 1100 m, *Z. Fuentes et al. 218* (INB); Monteverde Preserve, River trail ["Guanacaste"], *Gargiullo 562* (CR); Monteverde, La Torre, 1600 m, *Haber & Bello C. 2062* (MO); Reserva Biológica Monteverde, Research trail near field station, 10° 18' N, 84° 48' W, 1500 m, *Haber & Zuchowski 9295* (CR); Monte Verde, along Río Guacimal just below Lechería, 10° 17' N, 84° 48' W, 1500 m, *Hammel 13875* (CR,MO); Reserva Biológica Monteverde, Sendero Cascada, 10° 18' N, 84° 47' W, 1550 m, *Ivey 16* (CR); Reserva Biológica Monteverde, Research trail S. of Sendero Nuboso, 10° 18' N, 84° 47' W, 1550 m, *Ivey 21* (CR [2 sheets]); Monteverde, community, trail leading N. from Campbell's Bull Pen, 10° 18' N, 84° 47' W, 1450 m, *Ivey 39* (CR); Reserva Biológica Monteverde, Sendero Chomogo, 10° 18' N, 84° 47' W, 1550 m, *Ivey 46* (CR); Monteverde, Campbell's woods, 1520 m, *Koptur SK-277* (MO); Monteverde Cloud Forest Reserve, off of Nuboso Trail, 10° 06' N, 83° 26' W [sic], 1500 m, *J.F. Smith 530* (CR,F). San José: between Bajo La Hondura and Alto La Palma, 10° 2' N, 83° 59' W, 1400–1500 m, *Barringer et al. 4001A* (CR,F).

Geonoma brenesii comprises solitary, acaulescent, understory palms with spicate inflorescences. The new species closely resembles, and has been invariably confused with, the widespread and variable *Geonoma cuneata* (including *G. gracilis*). It differs from *G. cuneata* in having a comparatively narrow peduncular bract attached high (> 3 cm) above the prophyll and enclosed within it, a densely stellate-pubescent inflorescence rachis (whence the specific epithet), and female flowers with deeply crenately to subdigitately lobed staminodial tubes. In addition, *G. brenesii* is somewhat smaller in stature, with generally smaller leaf-blades, and occurs at higher

elevations than *G. cuneata*, which does not ordinarily surmount ca. 1200 m in Costa Rica. All of the specimens of *G. brenesii* collected to date have exclusively pinnate leaf-blades, never simple and bifid, as is often the case in *G. cuneata*.

The new species perhaps comes closest to *Geonoma paradoxa* Burret, of Pacific Colombia, comprising plants of similar dimensions, spicate inflorescences with the peduncular bract included in the prophyll, and female flowers with the staminodial tube digitately lobed. However, the prophyll and peduncular bract of *G. paradoxa* are attached close together near the base of the peduncle, and the inflorescence rachis lacks the whitish, stellate hairs typical of *G. brenesii*. The recently described *Geonoma hugonis* Grayum & de Nevers, of westernmost Panamá, resembles *G. brenesii* in having spicate inflorescences with the peduncular bract (when present) attached well above the prophyll and female flowers with the staminodial tube digitately lobed. This combination of characters blurs the distinction between *Geonoma* sects. *Geonoma* and *Taenianthera* (Burret) Wess. Boer, as discussed by de Nevers & Grayum (1998). *Geonoma hugonis* differs from *G. brenesii* in its caulescent habit, simple, bifid leaf-blades, obsolete or much reduced peduncular bract attached even higher on the peduncle (usually beyond the orifice of the prophyll), and non-stellate rachis pubescence.

Geonoma brenesii occurs sympatrically with another superficially similar taxon (acaulescent, with spicate inflorescences) that I have identified tentatively as a local variant of *G. hoffmanniana* H. Wendl. ex Spruce [a species that normally has (2-)3-17+ inflorescence rachillae]. This latter taxon, exemplified by *Haber & Bello 7316* (CR), has the peduncular bract attached high above the prophyll, as in *G. brenesii*, but differs in its subglabrous to simply pubescent inflorescence rachis and female flowers with truncate staminodial tubes. Also, the peduncular bract in *G. hoffmanniana* is usually well exerted from the prophyll (indeed, it is often attached beyond its orifice).

The species epithet honors Alberto Manuel Brenes Mora (1870-1948), who made the first collection known to me on 29 September 1925. Brenes, a native and lifelong resident of San Ramón de Alajuela, is one of the most celebrated and prolific collectors of the Costa Rican flora.

GEONOMA TALAMANCANA Grayum, *spec. nov.* TYPE: COSTA RICA. Limón: Cantón de Limón, Cordillera de Talamanca, N flank of Fila de Matama in headwaters of Río Boyei, 9° 45' N, 83° 19' W, 1200-1300 m, 17 Aug 1995, M. Grayum 11033 (HOLOTYPE: MO-4923462!, MO-4923463!, MO-4923464!; Isotypes: CR!, INB!, K!, NY!).

Species combinatione habitus solitarii acaulescentisque cum inflorescentiae longipedunculatae sine bractea pedunculari a congeneribus diversa.

Stems solitary, obsolete to ca. 1.5 m tall and ca. 1-2 cm diam. Petioles beyond sheath 9.5-30.0(-35.0) cm. Leaf-blades simple and bifid or pinnately compound with rachis 17-43(-58) cm, if simple 44.5-81.0 × 9.0-23.5 cm, oblanceolate, incised distally ca. 2/5-3/5 the total length, with 19-24(-40) primary lateral veins per side, if pinnate with leaflets (1-)2-4(-7) per side, 26-50 cm long (medial ones). Infls. interfoliar, spicate; peduncle 27.5-78.5(-81.5) cm, with no enlarged bracts above

prophyll; rachilla 9–26 × 0.25–0.50 cm, subglabrous or pubescent with short, appressed, inconspicuous, brownish hairs. Male fls. ca. 3.5–4.0 mm long; stamens 6, the anthers sharply reflexed. Female fls. ca. 3.5–4.0 mm long; staminodial tube subtruncate. Ripe frts. ca. 0.7–0.9 × 0.6–0.8 cm, obscurely tessellate-striate, broadly ellipsoid to ovoid, black.

Apparently endemic to Costa Rica, Atlantic slope Cordillera de Talamanca, 1200–1600 m; April, August.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Cartago: [Cantón de] Paraisó, Orosi, Muñeco, Finca Kuná, ca. 9° 47' 49" N, 83° 55' 04" W, 1350 m. Blanco *et al.* 456 (USJ). Limón: Cantón de Limón, El Progreso, area de suelos inundados entre 1500 y 1700 m, Fila Matama, 9° 47' 20" N, 83° 07' 30" W, 1600 m, Herrera & Chacón 2785 (CR [2 sheets]).

Geonoma talamancana comprises subcaulescent plants with solitary stems and spicate, interfoliar infls. lacking peduncular bracts. Except for the last-mentioned feature, this species differs only subtly from the widespread and variable *G. cuneata* (including *G. gracilis*), which has a prominent peduncular bract (ca. 11–51 cm long), attached near the prophyll and usually well exerted from it. In the field, *G. talamancana* presents a different aspect by virtue of its comparatively rigid leaf-blades with plicate venation. Furthermore, *G. cuneata* is a lowland species, that rarely if ever surmounts 1200 m elevation, at least in Costa Rica.

Collections of *Geonoma talamancana* have previously been attributed (in herb.) to *Geonoma jussieuana* or its apparent synonym, *G. lehmannii* Dammer *ex* Burret, both based on South American types. Although superficially very similar to the new species, *G. jussieuana* differs consistently (according to descriptions and herbarium material) in having a conspicuous peduncular bract, attached high on the peduncle and well exerted from it. I have examined a wide range of material from Costa Rica (outside the range of *G. talamancana*) and western Panamá determined as *G. jussieuana* or *G. lehmannii*, and have found no other collections definitely corresponding to *G. talamancana*. However, a few specimens with top-snatched inflorescences cannot be identified with certainty.

The absence of peduncular bracts is a highly unusual condition in *Geonoma*, otherwise known only in *G. monospatha* de Nevers (which occurs in Costa Rica) and *G. stricta* (Poit.) Kunth (see de Nevers & Grayum 1998). These species differ substantially from *G. talamancana* in their caulescent, potentially cespitose habit and small inflorescences with short peduncles and rachillae.

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